Review

Significance of simultaneous laparoscopic cholecystectomy in thermal ablation for hepatocellular carcinoma located adjacent to gallbladder

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Abstract

Percutaneous ablation therapy has been widely used for the treatment of hepatocellular carcinoma. However, choice of approach needs to be made with a careful consideration on the tumor location. We report a case of 62-year-old male who had been initially treated for hepatitis C by a general practitioner. In June 2006, since hepatocellular carcinoma 15 mm in diameter was detected by ultrasound, located in segment 5 adjacent to gallbladder, the patient was referred to our hospital. In this case, we firstly performed transcatheter arterial embolization. After seven days, we performed laparoscopic cholecystectomy in combination with additional laparoscopic microwave coagulation following percutaneous radiofrequency ablation. Complete ablation of the tumor was obtained. Notably, viable carcinoma cells were found in the resected gallbladder specimen.

Key words: hepatocellular carcinoma, laparoscopic microwave coagulation, percutaneous radiofrequency ablation

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Introduction

Radiofrequency ablation (RFA) is a useful treatment for small sized hepatocellular carcinoma (HCC). One of the major discussions on this procedure is the way to approach a lesion, such as percutaneous, laparoscopic and open ablation. Because of a risk of major complications, the choices should be carefully considered depending on the tumor location. According to several reports, complications of RFA occur frequently for patients having tumors superficially located, close to gastrointestinal tract, major branches of the bile duct or gallbladder. Most importantly, RFA should be performed safely to achieve a complete necrosis of the lesion. In a general thought, RFA performed percutaneously alone may not be a sufficient treatment when HCC is located adjacent to the gallbladder, resulting in a high possibility of carcinoma cells to remain. Therefore, we opted to perform laparoscopic cholecystectomy in combination with additional laparoscopic microwave coagulation (MCT) ¹⁾ after RFA performed percutaneously.

Case report

A 62-year-old male who had been diagnosed and treated for hepatitis C by a general practitioner was referred to our hospital because of a liver tumor detected by abdominal ultrasound. His abdomen was flat and liver was not palpable below the right costal arch. The palpebral conjunctiva was not anemic and bulbar conjunctiva was not icteric. Blood test results suggested that he had a mild anemia (hemoglobin and hematocrit levels were 10.4 g/dL and 30.1%, respectively) and liver dysfunction (aspartate aminotransferase and alanine aminotransferase were 63 IU/L and 68 IU/L, respectively). The serum levels of albumin, bilirubin and prothrombin activity were 2.7 g/dL, 0.4 mg/dL and 97%, respectively. Alfa-fetoprotein and des-gamma-carboxy prothrombin levels, the indicators of tumor markers, were 30 ng/mL and 15 mAU/mL, respectively (**Table 1**). The contrast-enhanced CT of the abdomen revealed hepatocellular carcinoma 15 mm in diameter located in segment 5 adjacent to the gallbladder. There was no distant metastasis.

In July 2006, Transcatheter arterial embolization

Table 1 Laboratory findings on admission

White blood count (/mm ³)	4600
Hemoglobin (g/dL)	10.4
Hematocrit (%)	30.1
Platelets (x10 ⁹ /mL)	12.4
Prothrombin time (%)	97
Albumin (g/dL)	2.7
Total bilirubin (mg/dL)	0.4
Alkaline phosphatase (IU/L)	363
Lactate dehydrogenase (IU/L)	217
Aspartate aminotransferase (IU/L)	63
Alanine aminotransferase (IU/L)	68
Alfa-fetoprotein (ng/mL)	30
Des-gamma-carboxy prothrombin (mAU/mL)	15

Figure 1 CT hepatic arteriography findings

Transcatheter arterial embolized HCC 15 mm in diameter located in segment 5 adjacent to the gallbladder (arrow).

(TAE) was performed on the patient. A celiac artery was enhanced by using contrast media through angiographic catheter inserted from right femoral artery. The tumor stain was found in segment 5. TAE was performed from anterior branch of the right hepatic artery by using mixture of iodized oil (2 mg) (Lipiodol: Guerbet), epirubicin hydrochloride (10 mg) (Farmorubicin: Pfizer) and geratin (Spongel: Astellas) (**Fig. 1**).

One week later, percutaneous radiofrequency ablation (P-RFA), laparoscopic cholecystectomy and laparoscopic microwave coagulation (Lap-MCT) were performed on the patient. P-RFA was firstly performed under general anesthesia. During P-RFA, the cool-tip RF generator (CC-1: Radionics,

Figure 2

Ultrasonographic view during P-RFA for HCC adjacent to the gallbladder (arrow).

Figure 3

Laparoscopic view during additional microwave coagulation for HCC after P-RFA and cholecystectomy.

Covidien at present) was used as the RFA coagulator and 17-gauge internally cooled electrode with 2 cm tip was used (Fig. 2). After the procedure, trocars were inserted to the lower umbilical, epigastric and hypochondriac regions. Pneumoperitoneum pressure was set at a level of 10 mmHg. Lap-MCT was additionally performed following Laparoscopic cholecystectomy to obtain complete ablation of the tumor. Microwave coagulator (OT-110: Alfresa pharma Corporation) was used for Lap-MCT. The ablation was performed for 60 seconds at 85 watt and dissociated for 5 seconds. Lap-MCT was performed firstly for the surrounding tissue of the tumor 4 times, and secondly for the center of the tumor one time (Fig. 3).

Ablative site including the tumor was shown in contrast-enhanced CT at one week after surgery (Fig. 4). Postoperative pathological examination revealed that there was viable hepatocellular carcinoma remained in the liver tissue attached to the serosal membrane of resected gallbladder (Fig. 5).

The patient had an uneventful postoperative course and was discharged from the hospital 10 days after the operation. At four years after the operation, there was no local recurrence at the ablative site although several recurrent tumors were found in the other site of the liver.

Figure 4 Abdominal contrast enhanced CT findings after percutaneous and additional laparoscopic ablation

There is low density area exhibited around the tumor, indicating that complete ablation is obtained.

Discussion

Ablation therapy has been widely used as one of the local treatment for HCC ². There are several reports warning of the risk of serious complications, such as liver abscess, gastrointestinal tract perforation, and diaphragmatic hernia in-

Figure 5 Pathological findings

A: There is small hepatic tissue attached on the serosa of resected gallbladder (arrow) (hematoxylin and eosin, $\times 2$).

B: Viable carcinoma cells are detected in the tissue (hematoxylin and eosin, $\times 20$).

duced by thermal injury³⁻⁶. According to several reports, rate of major complications of RFA is 1.9-10%^{5,7}. In addition, several reports described that Child-Pugh score, liver function, tumor size, choice of approach are risk factors for the major complications^{4,6}. And it has been reported that mortality rate associated with ablation therapy is 0.16%³.

Some of the major complications associated with biliary tract are biloma, bile peritonitis, hemobilia, intrahepatic bile duct dilatation, gallbladder perforation, biliary gastric fistula and hemocholecyst⁸⁻¹¹. Rate of complication developed after RFA is reportedly 3.3% for biloma, and 0.9%⁸ for intraabdominal abscess required percutaneous drainage. More frequent serious complication is late-onset biliary stricture. Some investigators suggested that those patients who had developed severe bile duct dilatation after RFA had a lower survival rate and higher recurrence than the patients who had not⁹.

Secondary hemocholecyst after RFA is a rare complication, and to date only 3 cases have been reported^{4,10,12}. In these reported cases, all patients had tumors located close to the gallbladder. If a tumor is located adjacent to the gallbladder, percutaneous ablation therapy may cause gallbladder injury. However, such complication can be avoided by a laparoscopic removal or mobilization of the gallbladder prior to the ablation therapy. Therefore, laparoscopic ablation is a useful option for the aforementioned cases¹³. Between March 2001 and October 2011, we performed ablation therapy to treat

HCC adjacent to gallbladder in 6 cases. Of these, three had ablation following mobilization of the fundus of the gallbladder, and the other 3 following cholecystectomy.

Regarding a preventative method against the bile duct injury, intraductal cooling has been reported effective¹⁴. That is, endoscopic nasobiliary drainage (ENBD) tube is placed in the bile duct before performing RFA to treat a tumor located close to the bile duct, and thereafter, chilled saline solution is infused into ENBD tube during the procedure. This method takes time and trouble, and rarely causes any complications including pancreatitis and duodenal perforation¹⁵.

In our case with the HCC located adjacent to the gallbladder, we opted to perform P-RFA followed by a laparoscopic cholecystectomy in combination with additional microwave coagulation. The implication of this option is based on the pathological findings on the resected gallbladder specimen where the viable carcinoma cells remained on the serosa of gallbladder. The findings indicated that P-RFA alone was not satisfactory in this case and removal of the gallbladder and additional MCT contributed to avoidance of local recurrence.

In conclusion, with respect to both complete ablation and safety, it is optimal to perform laparoscopic cholecystectomy in combination with intraoperative additional laparoscopic ablation following P-RFA for HCC located adjacent to the gallbladder.

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